

212 located on insulating stripe **213**. The connectors **211** and **212** providing a means for connecting the interface circuit **103** with low resistance elements **214** and **215** respectively. The two layers **201** and **202** are rectangular and the construction of layer **202** is rotated ninety degrees from that of layer **201**. Thus contacting portions **216** and **217** contact the conductive fibres in layer **201** along two opposing edges, and the low resistance elements **214** and **215** have contacting portions **218** and **219** which contact the conductive fibres in layer **202** along the alternate opposing edges.

[0040] The upper and lower fabric layers **201** and **202** are shown separately in FIG. 3. Fabric layers **201** and **202** are plain weaves having conductive fibres in both the warp and the weft directions and so are conductive in all directions along the respective layers. In FIG. 3, the warp fibres **301** of layer **201** are shown approximately horizontal and extend between the two contacting portions **216** and **217**, while the weft fibres **302** are parallel to the contacting portions **216** and **217** and are shown approximately vertical. In layer **202**, the warp fibres **301** are shown approximately vertical and extend between the contacting portions **218** and **219**, while the weft fibres **302** are parallel to the contacting portions **218** and **219** and are shown approximately horizontal.

[0041] It is advantageous to the operation of the sensor, when current measurements are made, if the layers **201** and **202** have anisotropic conductivity. In particular it is advantageous if the layers **201** and **202** are more conductive in the directions parallel to their respective contacting portions. Thus, when the sensor is operated and a voltage gradient is applied between a pair of contacting portions, the respective layer is most conductive in a direction perpendicular to the voltage gradient and less conductive parallel to the voltage gradient. To achieve the desired anisotropic conductivity, the warp fibres are chosen to be of a higher resistance than the weft fibres. For this reason, the warp fibres **301** are 24 decitex carbon coated nylon 6 fibres sold by BASF and identified by the designation F901, such carbon coated fibres are commonly available and are used in electrostatic dissipation applications. The weft fibres are 16 decitex monofilament fibres, electrochemically coated with nickel and/or silver, sold under the trade mark "Xstatic" by Sauquoit Industries Inc., Pennsylvania, U.S.A. Similar metallised fibres are commonly available and are normally used in electromagnetic interference shielding. Thus, a typical resistivity for a weft fibre is 500 ohms per centimetre, as opposed to approximately 200 Kohms per centimetre for the warp fibre. In layers **201** and **202** the fabric is woven with the same average spacing of 7.3 fibres per millimetre for both the weft and warp. Therefore, due to the different resistivity of the warp and weft fibres, the sheet resistivity of the layers in the directions parallel to the contacting portions is approximately 400 times less than the sheet resistivity in the perpendicular direction.

[0042] In an alternative embodiment the outer fabric layers **201** and **202** are replaced by outer fabric layers **401** and **402** respectively as shown in FIG. 4. The construction of layers **401** and **402** is similar to that of layers **201** and **202**, except for the type of fibres used in the weft and warp. Thus, contacting portions **403** and **404** are located along opposing edges of layer **401** and contact conductive fibres within said layer, while contacting portions **405** and **406** are located along the alternate opposing edges of the layer **402** and make electrical contact with conductive fibres within layer **402**.

[0043] Outer layer **401** includes conductive fibres **407** that conduct in the direction of the current flowing from contacting portion **403** to contacting portion **404**. Cross threads **408** conduct in a direction perpendicular to this one, and have the effect of ensuring a linear voltage gradient across the sheet, even when the resistance of connections between lateral fibres **407** with the contacting portion **403** and **404** are variable, as would be expected in a manufacturing process. Insulating fibres **409** are used between adjacent parallel conductive fibres **407** in the warp direction and between adjacent parallel conducting fibres **408** in the weft direction. Anisotropic conductivity is achieved, in the present embodiment, by selecting a different ratio of conductive fibres **407** and **408** to non-conductive fibres **409** for each of the warp and weft directions. Thus, in the direction perpendicular to the contacting portions **403** and **404**, which is horizontal in the drawing of layer **401** shown in FIG. 4, an insulating fibre alternates with a conducting fibre **402**. There is an equal quantity of both. However, in the perpendicular direction, there are two conducting fibres **408** for each parallel insulating fibre **409**. Thus, when the sensor is operated, in the direction perpendicular to applied current flow, or the direction perpendicular to the voltage gradient, conductivity is increased.

[0044] Outer fabric layer **402** has a similar structure to layer **401** but is rotated through ninety degrees. Therefore the weave includes weft fibres which are substantially parallel to contacting portions **405** and **406** and warp fibres which are perpendicular to contacting portions **405** and **406**. The layer **402** is anisotropic in a similar manner to layer **401**, since its weave contains two conductive fibres **408** for every insulating fibre **409** in the weft, while containing an equal number of conducting fibres **407** to insulating fibres **409** in the warp.

[0045] In the present embodiment, the conductive fibres **407** and **408** in both the weft and warp directions may be of equal resistivity since the anisotropic conductivity of the layers is achieved by selection of the ratios of conductive fibres to insulating fibres. Therefore, a similar carbon coated nylon fibre may be used in both the weft and the warp directions of the weave.

[0046] A portion of the sensor shown in FIG. 2 is shown in the cross-sectional view of FIG. 5. The spaces between the layers are shown exaggerated in this Figure, and the following Figures, in order to provide clarity. A force indicated by arrow **501** is pressing the sensor at position **502** against a solid surface **503**. At position **502** the outer fabric layers **201** and **202** are pressed against the respective mesh layers **204** and **205**. Also, due to the open structure of the mesh, the outer fabric layers are able to make contact with the central layer **203** through the apertures in the mesh and, moreover, the conductive fibres in the outer fabric layers make electrical contact with the conductive fibres included in the central layer. Thus, the conductive fibres in the central layer present a conducting means which provide a conductive path between the outer conductive fabric layers **201** and **202** at the position of the mechanical interaction.

[0047] In an alternative embodiment where the current measurement accuracy is not critical, costs savings are made by reducing the proportion of the conductive fibre to insulating fibre used in the outer layers, particularly by reducing the conductive fibre content in the direction parallel to the contacting portions.